

AJ6T>PPRS:

Hello fellow packet radio enthusiasts and welcome to a new year of PPRS activity. I hope that the club will be more active this year with many more members at least aware of the controversial issues surrounding packet radio today. The single biggest challenge facing all of us will be to cope with the continued explosive growth of this mode. More and more stations are competing for limited network services with the result that packeteers must deal with one of amateur radio's oldest nemeses: "ROTTEN QRM." Improved hardware and software will be our main weapons in this battle, but more immediate relief is available through improved operating practices. As the technical wizards come up with better digipeaters, modems and network software, lets all try to make the most efficient use of our existing equipment and networks. To initiate a vigorous debate on this topic, an article by an anonymous PPRS member has been included in the newsletter (see The Other Side of the Coin). What is your opinion? Do you have an opinion? Is anybody listening?

The December PPRS meeting featured a half dozen operating TNCs with hands-on experience available to all interested operators. The new PPRS Board of Directors was elected (president=Walter Miller, AJ6T VP=Jim Tittsler, AIBA treasurer=Bill Weaver, WA6FSP secretary=Carl First, N6CKV). Both WB6KHP and KK1A indicated that they plan to install new digipeaters. TAPR has announced that it is out of the TNC2 business; other vendors are now selling TNC2 clones under license from TAPR.

The highlight of local packet news this month was Tom Clark's (W3IWI) visit to San Francisco. Tom is past president of AMSAT and very active in packet radio in the Washington, D.C. area. He brought a portable packet station (TNC2 with special ROMS, Radio Shack model 100 computer, HT) which was capable of automatic operation as a test of SAREX2, the packet radio experiment which will be flown in the space shuttle in a few months. SAREX2 (Shuttle Amateur Radio Experiment 2) accepts up to ten simultaneous connections and issues a serial number for each QSO. Contacts are very brief (SAREX automatically disconnects as soon as it receives an ACK). Tom made a few hundred QSOs through the WD6CMU-1 digipeater on 145.09 Mhz. Tom's report on East Coast activity and suggestions to alleviate overcrowding are included elsewhere in this newsletter (message #2344 on W6CUS-1). He says that small LANs are becoming popular on the East Coast to avoid QRM and allow frequency reuse. Most of the EASTNET long haul packet work is via the automatic forwarding feature of WORLI mailboxes (like WESTNET, EASTNET is just too overloaded for reliable connections through more than two or three digipeaters).

The January 1986 PPRS general meeting will be held at the AMPEX cafeteria in Redwood City on January 7 at 7:30 pm. AJ6T will conduct a forum on "Upgrading from Novice to Advanced Packet User." A working TNC1 will be available for hands-on demonstrations. Invite your friends and come prepared to discuss the future of packet radio.



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THE OTHER SIDE OF THE COIN

by Swami Pa Ackit

DEC 5 1985

There seems to be some confusion in the PACKET RADIO World as where PACKET is heading and whence we are coming from, especially in regards to mailboxes. I'd like to help open up the dialogue a bit further with the ultimate aim of hopefully allowing us to refine our product and accomplish the task ahead of us more efficiently.

YES ON MAILBOXES

Firstly, without mailboxes, most of the interest in PACKET RADIO development would not have existed. BACK in the early 1980's the big feature of packet were the mailbox capabilities of being able to store large files in a timely fashion from diverse sources and download this information to local area use. This greatly stimulated many to link into this marvelous mailbox system (at that time KA6M-1 PACKET CENTRAL at Hanks place of business at Gamma Technologies).

HISTORY LESSON

KA6M-1 provided all the DRNET (Digital Radio Net) bulletins, GATEWAY MAGAZINE, ARRL BULLETINS, Satellite Orbital Predictions, HAMNET, USENET (INWARD BOUND AS WELL AS FILES FROM USENET), VANCOUVER BOARD PROM CODE UPDATES, Mailbox service, Archives of QSTs and Files containing many megabytes of packet radio history, as well as the use of the DATA GENERAL Computer system. Since the mailbox was low level, Hank put up a digipeater (KA6M-2) at 600 feet to serve the area (actually the digipeater came first). Later K6VCO put up a digipeater on the East Bay Hill site while Hanks' was located above Palo Alto. As a matter of fact, less than a year ago, the entire Bay Area had only these two stalwart digipeaters (K6VCO-2 and KA6M-2) serving the only Bay Area mailbox KA6M-1 except for the help of KA6NAN-1 at 2400 feet on Black Mtn, K6LY in Monterey and W3VS at 600 feet at Morgan Hill. Although us ragchewers would complain that when the mailbox "came-up", it didn't permit any other qsos to happen on the frequency and we would all grumble as we packed up and waited for the onslaught to end; we fullwell acknowledged that these digipeaters that we were using were there expressly to serve the mailbox and that if we didn't like it we were free to move off that frequency and set up our own digipatr. Few of us were into PACKET radio just for its ragchew ability.

It was shortly realized then that we needed a frequency to run to, separate from the mailbox, that would support us who couldn't work simplex direct (that meant we needed another digipeater or two or three or ...). We also realized that we needed to link South and North from our LAN (SF BAY). Most other areas like Sacramento, Fresno, Santa Cruz-wanted to link into this mailbox with all its "miraculous" files, but alas we realized that it would be best to keep the user node of the LAN separated by RF proof mountains, but link them on another frequency (non-user backbone frequency) hopefully on a higher baud rate. That way files could be shared with all, mail could be stored and forwarded, and LANs do not extend its users to greater numbers than it can handle. This dream has not yet been realized. It can be done only with MORE digipeaters and mailboxes in each user area. Notice I said more not less.

MORE PROPAGANDA

BEfore going much further lets address a few myths. As a PACKET RADIO group we should be encouraging groups to put up digipeaters and mailboxes not be discouraging this much needed development by labeling such efforts as "ego boxes" as was found on previous PPRS Newsletters. We have far too many collisions on 145.01 links and 145.09 to tolerate much more loading without even further degrading of the circuit. If stations had other frequencies to qsy for ragchew and/or filetransfer, then this would help much, but most need a digipeater to move to. In the first days away from 146.58 Mhz and KA6M-1, W6AMT first provided that alternative but that system was designed from the start to provide linking and not just local digipeating. (By the way guys the W6AMT digipeater is less than a year old)! This was a needed and greatly applauded accomplishment, however, let us all realize that the long term linking design system cannot be on 2 meters for many reasons.

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The largest obstacle to using 2 Meters as a link frequency is its overwhelming popularity. You simply don't want end users on your link frequencies (you can however dualport an end user node with a link frequency node through a dualport digipeater or a multi node system). Another severe restriction is the baud rate limitations imposed by the FCC on 2 Meters at 19.6 K Baud. Links should be highspeed and the technology available and affordable to allow us to do highspeed linking on our 20 Khz bandspacing on 2Meters does not seem to exist within the near future. However, we do need an interim solution for an interim that may last many years. As long we realize this is not to be confused with the longer term solution of lifting the link frequency off the "enduser" frequencies at the highest baud rates, then we can at the same time offer interim and longterm solutions.

PROPHECY! MORE DIGIPEATER CRASHES IN THE FUTURE!.

The future is difficult to predict. One thing is certain that we will be doubling or maybe tripling our packet user base in the next year. Are we planning for that? The answer is not very well! W6CUS-1 mailbox is seeing about 3 new users per day. At that rate it may be able to oblige the Bay Area 145.09 Mhz users each about 3 minutes each day. Indeed some have already made some suggestions. One very serious suggestion was to put a 5 minute timer on each log-on or they would be eaten by the "alligator". Another has suggested to muzzle the mailboxes with a 30 second transmit delay after hearing another packet! Yes there have been other proposals as well! Certainly this shows that there is a deep dissatisfaction with mailboxes on our use frequencies. There is one very easy solution if we had enough mailboxes to support this and digipeaters to support these new mailboxes. Each local area network will be served by a low level fileserver/mailbox that would be in turn linked to the rest of the LAN via a medium level digipeater or series of digipeaters. For example San Francisco and parts of the East and North Bay may share one mailbox on 145.09. The Concord Sacramento Area may be on 145.07 Mhz. The Santa Rosa area staggered yet on another 2 Meter freq. Santa Cruz area would also have a digipeater on the South side of their mountains serving as their own file server. The South Bay would have yet another LAN. Frequencies for the 2 Meter user node would be staggered so that loading in one LAN would not interfere with the other and linking could be done between LANs on a multiport or dualport digipeater. Technology is already affordably available for this to occur via 9.6K BAUD using K9NG modems and modified Z 80 like the Xerox 820 or the upcoming TAPR Network Node Controller on 220 wideband PACKET channels. Although it is affordable and available and will lift the heavy loading and speed the linking, it's happening slowly, and in insulated areas. Southern California and the East Coast are much further along toward putting such a system up while using WORLI store and forward mailbox systems to handle the message forwarding. It seems we are in a holding pattern waiting for the "better way". I think we all agree that are "better" ways, but available hardware is one thing and vaporware another. Are we to do nothing in the interim? Whatever we do, let's discuss it and work toward the common goal avoiding waste and uncoordination.

POLITICS IS GOOD !

For myself if I want to raychew long distance I go on HF or make use of the "CONDOR" connection or the "GZK" linked voice networks. They are far faster than packet for that kind of communication. PACKET 2 Meter multihopping may be fun for the newcomer but its charms quickly wear off with overloaded channels, low throughput and multiple reconnects due to "retrying-out". Passing long files through 4 hops or more also takes a dedicated spirit with more patience than I (although at 3 AM much can be accomplished). I see packets greatest asset in its file servers and mailboxes. This seems to be a national service that the other modes can never rival! Of course, the eventual linking if these mailboxes will require intelligent cooperation with those who have the LINKING abilities. I hope that a friendly dialogue in a cooperative and constructive manner may emerge in this newsletter or on the mailboxes, so some of these accomplishments

could be further developed, in an open atmosphere.

Amateur radio planning cannot be done in isolation and secrecy. There are too many differences between the competition of Silicon Valley secrecy and amateur radio cooperative efforts such as ARES, radio club repeater groups, technical societies, amateur radio clubs, NTS, etc. It seems that we have a lot of well meaning people out there working on a common goal but with different solutions and they don't seem to be talking to each other about what they are doing! Wouldn't it be nice if PPRS could sort of try to bring this effort together? Do we any longer believe in ourselves? Do we believe that there is no intelligent planning to be done in our area for both long term and short term PACKET radio development? Or do we rather believe that it is easier to have chaos and competition decide for us and pretend no more about leadership for fear of criticism and/or the ordeal? Like a democracy, apathy is a step away from slavery! Maybe in 1986 we will hear more participation from the PPRS membership and the PACKET Community as a whole and make the future the place we want it to be!

The Buck Stops Here!

So fellow packeteers arise to the occasion! Things will only get worse before they get better. If your area had a medium level digipeater up on 5.03 then you wouldn't be complaining that the link frequencies of 5.05 or 5.01 or the mailbox frequency of 5.09 was always busy. We could move a lot of endusers who didn't need the mailboxes or long dx links to ragchew and file exchange there. Does your area have a 5.03 machine? Maybe less complaining and a little more effort locally with other packeteers could do the trick more efficiently? Are your locals multihopping 2 hops or more to use a mailbox? Maybe it's time to think about setting one up now for your local area net on 5.09 or some other frequency. What if someone put up a supermailbox on 223.58 MHz, do you think we will get some packet activity there? If you have ideas for a mailbox, talk it over with the existing mailbox sysops in your area first. Depending on your location 5.09 may or may not be optimal for overall loading. Communication from all the California mailbox sysops indicate that they all want to link. How this can be done has already been discussed and most are hopeful for a 9.6 K Baud dual port system to accomplish this within the State; but the time frame of when this can happen is directly dependent on creating the multi or dualport links.

Mailbox systems currently in place in Northern California;

Call	Location	sysop	freq.	Digipeater
W6CUS-1	Richmond	sysop:WD6CMU	145.09	N6IJP-1 WD6CMU-1 N6GGA-1
WB5VUL-1	Palo Alto	N6FQR	145.09	N6IIU WD6CMU-1
WA6NWE	North Highlands	WA6NWE	145.09	N6IJP-1
N6FZP	Stockton	N6FZP	currently 01 moves .09)	W6BXN
WA6OSA-2	CLOVIS	WA6OSA	145.01	W6BXN WA6YLB
WB6AIE-2	FRESNO	WB6AIE/WA6OSA	145.05	WB6AIE-1
W6IXU	ARROYO GRANDE	W6IXU	145.01	W6AMT-2 W6AMT-1 KA6SOX-1
AA4RE	Gilroy	AA4RE	145.09	W3VS

Since these mailboxes are sharing frequencies with heavy loading it is best to try to adhere to certain operating rules until we can stagger LANS.

1. Use the lowest digipeater with the least coverage to accomplish the task or go direct wherever possible on another frequency so hanging up of adjacent digipeaters is reduced to a minimum.
2. Attempt to do ur mailboxing on off main hours if possible. Prime time is 5-11 PM ys and 11 AM to 11 PM on weekdays and holidays.

- 4
3. Attempt to arrange ur uploading file ahead of time so that u can have everything ready to go before you log into the mailbox and avoid "realtime" typing.
 4. Store long lists , directories, help documents, etc to disk or paper so that you do not need to download the same files over and over again.
 5. If you must do primetime mailboxing (most of us do) limit it to under 45 minutes maximum with lesser amounts being appreciated by those waiting.

Anyone out there have other ideas? Anyone willing to write better mailbox code? I think we all have different : from a mailbox. A small percentage may have no need at all, hi! I've heard them called useless and less. Certainly none of them are perfect. If we had the people willing to work on code many of these boxes can be customized for local area nets.

If you want a source code for the WORLI system and want to work on code contact WD6CMU . Also contact Eric if you want a copy of the program.

If you want a copy of the W6IXU mailbox program which is written in very portable C and has been ported over to IBM PCs, XEROX 820 s and many other systems contact W6IXU or WA6OSA.

N6FZP is running a public domain Mailbox program on an IBM PC.

AA4RE is running a new IBM PACKET MAILBOX system and you may leave a message for him on any of the Bay Area mailboxes for furthers.

The Interim? - More Snow Forecast!

The future is up to you! Packet is definitely a baby. It could use some leadership! There is chaos as far as coordination of HF frequencies and mailboxes and this has lead to much added qrm and degrading of available circuits. There is much to do on the local level as well. Get active with your local group ! Some bright notes!

WORLI is working on porting mailbox code into the new TAPR Network Node Controller. This would give us a powerful multiuser, multiport, n-port mailbox system capable of doing alot of store and forwarding.

N6FQR is working on some hard disk modifications to the Xerox 820 board parallel port to allow a hard disk interface at very low expense. He is also working on porting over the WORLI mailbox code to work with the WA8DED TNC proms. Bill is also working on an auto hardboot prom for the WORLI mailbox system.

WD6CMU is working on a Xerox 820 dualport digipeater. The K9NG modem is complete and the 220 rig is crystaled up on 220.95 Mhz. Anyone want to test ? W6CUS-1 hopes to have its HF gateway back on-line after the software unreliability problem is resolved.

KA6IQA at Torrey Pines is working on an East Coast satellite gateway link up.

Im sure there's other news out there . Dont keep it secret gang!
Send it in!

73,

de

SWAMI PA ACK IT

Msg#	TR	Size	To	From	@ BBS	Date	Title
2344	BN	2420	ALL	W3IWI		851212	Tnx for the hospitality -- 73

This note is my opportunity to say thanks to all the San Franciscans for your hospitality during my brief stay. Your help in testing the SAREX2 robot was most appreciated. Your testing in response to my "make my day" request has helped to find one potential "crash and burn" mode in the software which we shall strive to fix.

To those of you who I had the chance to meet personally, I really enjoyed the opportunity to discuss packet radio. My observations are that the growth problems you are facing are almost identical to those we have felt on the east coast. It is clear to me that national planning on both the hardware / software and applications fronts is needed so that the growth we are now experiencing does not become a noose around our necks.

I passed on to a few of you some hints that we have found useful on the east-coast for improving the performance of local area networks during times of high usage. One set of these recommendations involve DWAIT and FRACK parameters: BBS and file transfer applications should use longer DWAITs (typically 8-12 for TNC1's) to lower their "priority" and FRACK should be set to larger values (6-10) when the channel is busy.

As another hint, we have also found it useful to keep long files off our BBS's; the W3IWI BBS now no longer carries GATEWAY, W5YI report, etc., and material from DRNET is broken up into smaller files, for example.

On the east-coast, store-and-forward message handling between BBS's spanning upwards of 500 miles has become the norm (the 'IWI BBS just passed message #10,000 in 15 months of operation). Our systems are evolving towards a "cellular radio" architecture with restricted geographical coverage based on local-area networks (LANs) on different frequencies with segregation based on geography rather than usage functions.

Just like you, we on the east-coast are eagerly awaiting the advent on reliable high-speed links to interconnect the localized LANs. Those of you looking for a technical challenge would make a big contribution to packet radio if you could develop reliable radio / modem technology to support "backbone" links of 9.6 kbaud or higher.

I hope that some of the personal contacts we have made during this brief visit will help improve communications between the coasts. Our problems are the same and solutions from one area can help in another. Let's keep in touch!

73 de Tom, W3IWI

M 16146 Phil R. Karn (ka9q,2979) 11/20/85 2:03 PM L:29
KEYS:/PROTOCOL WARS/
TO: K76M, WA6JPR, WB6HHV, ka9q

Wally, what's this about Paul saying that the Europeans would never "buy" TCP/IP. How come? Is it because it isn't a CCITT protocol? Neither is AX.25, despite the name, but there doesn't seem to be a problem with it in Europe. Is it because the DoD uses it? Tell him that I'm a pacifist too, but that doesn't prevent me from pulling some civilian "salvage value" out of the trillions we spend on defense. And just who are the "Europeans" who say this, anyway? I wonder if Paul has been listening to Gordon Beatlie who says this, since this is one of his favorite themes. The effect of "disqualifying" TCP/IP would be to eliminate the only practical, proven and effective datagram protocol from consideration; the TP-4 "alternative" is still just a (changing) paper tiger, and the sun is likely to be in its red giant stage before that thing becomes anything else. I'm pretty upset about this, because all along I have worked on the assumption that the best protocol from a technical standpoint would have the best chances of being adopted, and now you tell me that political considerations make my efforts futile. ARGH!!!

In any event, I have spent a lot of time recently polishing off a TCP implementation written in C. As I've said in 2973, I've successfully tested it over an asynchronous serial line into the ARPA Internet, establishing connections and logging in to machines. Read also my comments about SLIP; this is a way that TCP-based hosts and IP/AX.25 packet switches could be separated into different boxes without requiring HDLC interfaces on everything. All you need to run my TCP is a machine with a conventional async RS-232 port, and that line connects to an 820 which does packet switching and also has the AX.25 channels.

Phil
M 16287 Wally Linstruth (WA6JPR,2989) 11/20/85 11:43 PM L:52
KEYS:/POLITICS/820 QUESTIONS/
TO: ka9q, WB6HHV, KA6M

HI PHIL,
I'M MYSTIFIED TRYING TO SEE THE LOGIC OF PAUL'S STATEMENTS REGARDING TCP/IP RE THE "EUROPEANS". I HAD ACTUALLY CALLED HIM TO DISCUSS TRAVEL ARRANGEMENTS FOR THE MEETING AND TO SEE IF HE WAS INTERESTED IN HAVING AN IP SPEC FOR THE AGENDA. HIS RESPONSE TOOK ME BY SURPRISE AND I DIDN'T PURSUE IT IN DETAIL AT THE TIME. HE SAID IT SO MATTER OF FACTLY THAT I REALLY WONDER IF HE COMPREHENDS THE GRAVITY OF WHAT HE SAID. I TRUST YOU WILL BE AT THE MEETING. I DON'T THINK THAT POLITICS WILL BE THE SOLE ARBITER OF THE ULTIMATE PROTOCOL DECISION, AT LEAST IT HAD BETTER NOT BE. I WILL CALL PAUL IN THE NEXT DAY OR SO TO GIVE HIM MY TRAVEL ARRANGEMENTS AND WILL TRY TO GET SOME FEELING OF WHERE HE'S REALLY COMING FROM.

PROBABLY BETTER TO SEE IF IT WAS A REAGAN STYLE "GOOF" BEFORE WE START POUNDING ON THE TABLE.

73 - WALLY
M 16266 Jack Brindle (WA4FIB,2963) 11/20/85 10:20 PM L:20
KEYS:/SESSION LAYER PROTOCOL/
TO: (Group 95)

Note to all about my session layer specification.
I will be uploading the specs as soon as I figure out how to work with notebooks. Apparently this is the best way to post the spec, so it will be the way I use. I will hopefully be uploading it right after the weekend, when I get a chance to put it into a more readable form (electronically at least). The document is in Macintosh MacWrite format, and would be almost impossible to read on a "normal" terminal.

I am releasing the spec at this time to help in file transfers and the coordination of multi-connect qos (both with a single station and several). Although it may duplicate some of the functions of TCP/IP, it is needed now, and there is no reason to delay until a network scheme has been chosen. The session layer is a new layer in the network model and is not a part of the network layer.

be using it for binary file transfers. The only assumption that the protocol makes is that a network and transport layer will someday be used, so that "placeholders" are placed between the link layer header and the session header. These placeholders consist of a pair of NULs (hex 00), indicating a GFI of zero (network layer) and a TPDU length of 0 (transport length).
Watch for the upload, probably to occur early next week.
73, Jack B, WA4FIB.

M 16663 Tom Clark (W3IWI,2976) 11/22/85 2:16 AM L:29
KEYS:/WORLD CLONE FOR IBM-PC/TURBO PASCAL/DE WA7MBL/
TO: (Group 95)

The following is forwarded from the W3IWI and W3VH BBS's:
W3IWI at 851122/0433: Last msg # 9590, 73 active msgs
(B,D,G,H,I,J,K,L,R,S,T,U,W,X) >
Msg# TR Size To From @ BBS Date Title
9588 BN 1532 ALL W3VH W3IWI 851122 IBM WORLD CLONE
Via W3VH From W3VH: Msg# 238, Rcvd 851122/0321z, Sent 851122/0325z
233 BN 1407 ALL W3VH W3IWI 851121 IBM WORLD CLONE
The following ported from Compuserve Hamnet:
I have almost finished a translation of the W0RLI BBS software into Turbo Pascal for use on IBM PC/XT/AT. The Mail portion, including forwarding, and the Gateway portion all seem to work fine. I haven't added "J" lists or monitoring yet, and still have to add a few local commands. I will upload the program as soon as it is finished. However, there is very little activity here (at present I can contact 2 others on packet) which makes testing a little difficult. Also, I am working from a source listing, but have never seen a "real" W0RLI BBS in operation and have no access to an 820 to try it, so I can't be sure if it looks exactly correct. If someone is interested in testing it as is, I would be glad to mail a copy on diskette before I spend a small fortune uploading it here. I am working with the version 10.2 source and should be compatible with the latest forwarding methods. If you really want to test it, send me your address via Easyplex (so it doesn't scroll away while I'm at COMDEX) and I'll mail you a diskette. If you just want to try it, mail me a diskette and I'll copy it off for you. I'm testing it as best I can here with a TNC-1 on one port and a TNC-2 (v1) on the other with no apparent problems.

Jeff Jacobsen, WA7MBL, 1400 E 900 N, Logan, UT 84321
MCI Mail: 230-9237 Easylink: 62845849 BIRNET: BOBW@USU CS: 72446,2557
M 16900 ROBERT J DIERSING (N5AHD,2959) 11/22/85 9:54 PM L:50
KEYS:/PACKETS AT PROGRAMMING CONTEST/
TO: (Group 95)

ACM South Central Region Programming Contest Problem 1
A text message has been received from the ACMSTAR satellite. The message is encoded as a file of packets named packets.dat. Each packet contains seven (7) characters along with error-detection and correction information. You are to create files message.dat and errors.dat which are to contain the decoded message and an error report, respectively. These files are described below

The above is the preamble from one of the programming problems for South Central Region ACM programming contest held in Houston last week, conjunction with the annual regional meeting. I surely didn't expect to reference to packets and satellites in any of the problems and I thought that the group might be interested in this. There was also a problem involving finding reachable nodes in a computer network.

An interesting side story is the fact that I have been teaching a telecommunications course this semester using "Computer Networks" by Tanenbaum. Those of you familiar with this book know that Chapter 6 is devoted to satellite and packet radio networks. Needless to say, a demonstration of several TNCs was done at the appropriate time in the course. The only holder of an amateur license in the class is not active on packet but he was a member of our contest team. He found it quite amusing when few of the other teams really had a handle on the problem.

Now I'll have to blow our horn a little. Most people have never heard of Corpus Christi State University but you will have heard of some of the schools in the overall ranking of teams: (1) Rice #1, (2) Texas Tech, (3) Rice #2, (4) CCSU, (5) Texas A&M #1, (6) University of Texas at San Antonio, (7) University of Texas at Arlington #1, (8) UTA #2, (9) Tulane, (10) Baylor, (11) Texas

Christian University #1, (12) SE Louisiana, (13) University of Texas at Austin #1, (14) University of Southwestern Louisiana #1, (15) Texas A&M #2, (16) University of Tulsa, (17) USL #2, (18) TCU #2, (19) McNeese, (20) University of Arkansas, (21) East Texas State, (22) Lamar, (23) University of Houston - Clearlake, (24) Midwestern, (25) UT Austin #2, (26) University of Houston - Clearlake, (27) Oklahoma State #2, (28) Oklahoma State #1, (29) SLU Hammond.

Our team was in division I is which teams consist of at least one graduate student. In division II all team members are under-graduate students. As far as we are concerned, a 4th place in division I is nothing to sneeze at. In the combined standings they were 5th out of 45 teams.

73, Bob

C2987 CC236 Tom Clark (W3IWI,2976) 11/22/85 2:08 AM L:46
KEYS:/DE WB6RON/TNC2 PROBLEM/HELP SOUGHT/

The following is relayed from the W3IWI BBS:

Msg# TR Size To From @ BBS Date Title
9573 Y 1653 W3IWI WB6RON 851121 TNC2 problems
Tom please forward to the appropriate folks (thanks).

Subject: TNC2 problems

I have been having a rash of problems with my TNC2 that brings its reliability into question. First the environment.

My TNC2 is connected to a UNIX SysV system allowing hams to enter and use my UNIX machine. When a connection is established, DCD from the TNC goes on, and UNIX presents the login message. This works -*MOST* of the time. The TNC2 is a Rev 1 with the 1.1.0 firmware. The TNC is all CMOS with the exception of the SIO. The TNC is placed in the transparent mode and remains there always. TXFLOW and TRFLOW are enabled and seem to be working. The TNC fails in one of several manners:

1) The TNC will ignore all connect requests but will digipeat frames and will continue to beacon.
2) The TNC will ignore connect requests when the requesting station is coming through a digipeater, but will readily connect when the station is direct (no digis).

3) The TNC will connect but will not pass any information to the computer. Connecting a terminal will allow me to issue commands, connect, and disconnect but I cannot ever get it to pass data in the direction of the terminal or computer. When it gets wedged in this mode the only remedy is to power down the RAM (remove it from its socket). Turning the power off then on doesn't help in this case, although it fixes #1 and 2 above.

I am at Wits End. I do not know how to force the TNC into this mode although circumstances get it there about once every two days.

73 de Brian, WB6RON

BBS: WB6RON @ W3IWI

uncp: ...lbelcorelyojnalwb6ron

N4KRR would like to use the MailBox when you are done, Tom.

W3IWI at 851121/1426: Last msg # 9577, 72 active msgs

(B,D,G,H,I,J,K,L,R,S,T,U,W,X) >

Msg# TR Size To From @ BBS Date Title
9577 N 438 WB6RON W3IWI 851121 TNC2 problems

Brian -- one thing I discovered here that caused some grief that might be ur problem. Look at the manual under CANPAC and notice that if a CANPAC character is received in cmd: mode, all output ceases until a second one is rcvd. Here I have disabled CANPAC (and also CANLINE for safety) by setting both to zero. I got burned when a bad spot on a disk got a ctrl-c and then later a ctrl-y embedded in it inadvertently. See if that fixes it.

W3IWI at 851121/1427: Last msg # 9577, 72 active msgs

(B,D,G,H,I,J,K,L,R,S,T,U,W,X) >

C2987 CC237 Howard Goldstein (N2WX,2987) 11/22/85 8:42 AM L:24
KEYS:/LEVEL 3/VERY PRELIMINARY CODE/+READ/USE AT OWN RISK/

To: Curious Beta

Fm: Howie N2WX

Re: AX.25 Level 3 for 16K TNC 2s

dist: Closed (it ain't done)

Hi folks I have placed here on EIES some .HEX (quite a bit actually) that runs level 3.

IT IS VERY PRELIMINARY AND VULNERABLE TO ABUSE! I offer it merely to placate any disbelievers you may have run into who say it can't be done on a z-80 or it's too hard to implement or any number of other specious excuses.

Please +READ C2987 CC237 to get about 2 pages of survival sheet, and then the appxly 59K of .HEX. I suggest that if your interested, do the +READ but interrupt it when it starts on the .HEX. Peruse the "documentation" and decide if you want to +READ the whole thing.

Obviously to get full benefit (THAT claim is specious in its own right at this time!) one should have access to at least two TNC 2's.

73 Howie

C2987 CC238 Phil R. Karn (ka9q,2979) 11/22/85 2:57 PM L:15
KEYS:/ME TOO1/

My TCP/IP implementation has been running nicely on the IBM PC for the past week. It has been tested successfully with about 8 or 9 different TCP implementations out on the ARPA Internet. Tests included sites like Raising, West Germany (whoever said that TCP/IP was forbidden in Europe?) and self-connects through special "echo" servers.

HINT:

If somebody will give me a programmer's view of the TNC-2 (port assignments, memory layouts, etc) I can begin porting this code, which is entirely in C, to the TNC-2.

By the way, the total size of the runnable program for remote login is 18K on an 8088, and this includes quite a few K of debug "scaffolding".

Phil

M 17010 Rich Amundson (WA0JFS,2965) 11/23/85 9:11 PM L:22
KEYS:/SAREX-2/
TO: (Group 95)

TO: MAPR, SLAPR, OTHER MIDWEST GROUPS
FROM: RICH AMUNDSON CITS
RE: SAREX-2

IN TRYING TO HELP DEBUG AND TRY OUT THE SAREX-2 HARDWARE SYSTEMS, CITS WILL BE A BETA SITE OF THE SOFTWARE. ONE OF THE TRIALS WE WILL USE WILL BE TO PUT A COPY OF THE SYSTEM IN AN AIRCRAFT AND ORBIT AT ABOUT 10,000 FEET OVER CENTRAL IOWA. WE HAVE DONE THIS BEFORE IN CONJUNCTION WITH THE NORTH AMERICAN TELECONFERENCE NET AND HAVE HAD RESPONSES FROM THE KANSAS CITY, ST. LOUIS MINNEAPOLIS, CHICAGO AND CENTRAL NEBRASKA AREA. WE WOULD VERY MUCH APPRECIATE IF ANY OF THESE GROUPS OR INDIVIDUALS IN THIS AREA WOULD LIKE TO CONTRIBUTE FUNDS TO OFFSET THE COSTS OF THE AIRPLANE. WE ARE USING A CESSNA 182 THAT NOBKB HAS AN INTEREST IN. THE COST WILL BE ABOUT \$38.00 PER HOUR I BELIEVE. WE WILL BE USING ABOUT 3 HOURS OF FLIGHT TIME TO GET A GOOD SOLID 2 HOURS ON STATION WHICH SHOULD GIVE A GOOD INDICATION OF HARDWARE CAPACITY. WE WILL ALSO BE CAPTURING THE DATA DOWNLINKED TO USE IN THE EFFORT TO GET STATION HEARD AND CONNECT LISTS.

IF ANYONE HAS SOME HELP TO GIVE PLEASE LEAVE ME A NOTE HERE OR YOU CAN GIVE ME A CALL AT 515-285-3352 EVENINGS. THANK YOU.

73'S RICH WA0JFS

C2973 CC44 Rich Amundson (WA0JFS,2965) 11/23/85 8:57 PM L:16
KEYS:/NETWORK CONTROLLERS/

TO: LYLE JOHNSON(TAPR)
FROM: RICH AMUNDSON(CITS)

LYLE,
DAVE HUFMAN, ON SEEING ALL RELEASED DATA ON THE TAPR NNC, DOESN'T SEE ANY REASON THE WORK WE ARE DOING WON'T PORT OVER TO THE 64180 ENVIRONMENT AS IT IS IN Z-80 ASSEMBLER. WE ARE AT THE POINT OF APPLYING POWER TO THE 9600 MODEMS TO SEE HOW THEY MARRY TO THE FM-5 BOARDS. THEN WE SEEM TO BE IN THE MIST OF THE SAREX-2 PROJECT ALSO WITH MYSELF AND NOBKB PLANNING TO MAKE A FLIGHT OF THE HARDWARE WITH WA2GTM AS OPERATOR ON DEC 11 OR THE 18TH FOR WEATHER BACK-UP. THIS SHOULD GIVE A GOOD SHAKE-UP OF THE SYSTEM BASED ON THE RESPONSES WE GOT WITH SIMILAR FLIGHTS WE MADE FOR TWO OR THREE WEEKS AGO.

KEEP UP THE GOOD WORK.
73'S RICH WA0JFS

M 17130 J. Gordon Beattie Jr. (N2DSY,2990) 11/24/85 5:14 PM L:10
KEYS://IS A CESSNA 414 FOR FREE USEFUL TO THE SAREX-2 TESTING ?/
A: 17010 TO: (Group 95)

Rich et al:

Regarding the SAREX-2 test flights, I travel each week for a total of thirty hours in a Cessna 414 at altitudes ranging from 8500 to 17,000 feet. Routes include New York to Texas, Alabama, Missouri, Illinois etc. Can we be of assistance in testing of the package? We can provide pressurized or non-pressurized environments. I will be able to post airtimes a week or more in advance. If this is useful let me or Tom know.
73, Gordon

M 17147 Lyle Johnson (WA7GXD,2973) 11/24/85 9:27 PM L:27
KEYS://NNC/DRNET/IMAGE/PROJECT/WIDEST POSSIBLE DISSEMINATION/
TO: WA7GXD, (Group 95)

all,

I have been speaking to a number of people recently, and there have been a number of negative comments about DRNET and "secret projects" -- both in reference to the NNC project.

PLEASE PLEASE PLEASE PLEASE PLEASE if you haven't already done it, check into conference 2974 and 2973 and put the info there on the NNC discussions on your PBBS for wide dissemination.

Remember, DRNET is for info spreading throughout the packet community, NOT a private messaging system. The NNC is NOT a "secret project" and I have been actively soliciting inputs from the widest possible audience.

I am happy to report that the SouthNet II conference in Atlanta, from which I returned a couple of hours ago, was a very interesting and successful regional packet forum. The NNC was publicly shown for the first time, and there is a lot of positive response. I will be porting on DRNET, FOR WIDEST POSSIBLE DISTRIBUTION a description of how to get involved in working on the project and testing it in the next day or so.

Again, if you have a PBBS, or easy access to one, PLEASE post these discussions on the NNC. Reaction to the NNC has been generally very positive, but we have an image problem with DRNET being a closed medium. That is NOT the intent.

Thank you. Level three, here we come!

M 17541 Gwyn Reedy (WBEL,2975) 11/26/85 6:01 AM L:29
KEYS://CALL FOR PSR ARTICLES/
TO: (Group 95), WBEL

The deadline for the January issue of the PSR Quarterly is Dec 20th. This is a 'no-slip' date because the PSR has to be finalized and in the Fed-EX to TAPR by DEC 30 in order to get the director ballots out in time before the board meeting.

I encourage all previous and potential writers to contribute. The support to date has been fantastic, and I am hopeful it will continue at such a strong level. Articles about construction, modification, or understanding of hardware and software are especially useful. As always, more info on networking is desired, either tutorials, or cannonballs in the 'protocol wars.' Historical articles would be nice too - remember that half of the packeteers in existence got on the air this year, and an old timer is a guy that was on in 1984...It is good to document things that went on in 1978 - 1984 for these people.

Please send in those articles. I will do the minimum amount of editing to your input. Primary editing is done to reformat and reduce length in order to improve layout. Send here, or CIS (76576,2003), or mail a diskette (8 inch SSDD or 5 inch Kaypro 4, or 360k PC format), or as a last resort, a typed copy. Mail to PSR Editor, 812 Childers Loop, Brandon, FL 33511. If there are diagrams or drawings, either send camera ready copy or get the drawings in extra early so there is time to have them redone.

Thanks and I'm anxiously awaiting inputs. Gwyn

P.S. Good reviews of the TNC2, Kantronics rev 1.6, AEA PK-64 and PK-80, the new GLB low power model, new terminal software etc, would be greatly appreciated by the readership.

M 18103 Lyle Johnson (WA7GXD,2973) 11/28/85 11:35 PM L:87
KEYS://THE RUMORS ARE TRUE/PLEASE SPREAD THE WORD/
TO: WA7GXD, (Group 95)

To: All Amateur Packeteers,

Fr: TAPR

Re: Availability of TNC 2 (or, The Rumors are True!)

For Immediate Release

Tucson Amateur Packet Radio is pleased to announce the cessation of its production of the popular TNC 2 kit!

Yes, pleased. An all volunteer R&D, manufacturing, marketing, and support organization is fun for awhile, but it soon takes a great toll on all involved.

TAPR began life in 1981 with a simple goal: To experiment with packet radio and packet radio networks. At that time there was little in the way of easily acquired packet equipment. TAPR took a short side trip into the manufacturing world - to permit widespread experimentation with packet radio by making high quality software and hardware building blocks available on a large scale at low cost.

That job is now complete. The TNC 2 design is stable, and presents a good balance between small size, low power, and ease of manufacture, while still allowing for high speed, full duplex operation, adaptability to future requirements such as split baud rate operation, and easy interface to future modem designs.

It is now time to turn the manufacturing and marketing tasks over to industry, and to continue with Research and Development in new areas of packet radio. We have made our TNC 2 design available to others through an OEM agreement. These alternate sources are listed below:

Advanced Electronic Applications, Inc.

PO Box C-2160
Lynnwood WA 98036
(206) 775-7373

Model PK-80. Assembled and tested only. Available from dealers.
(AEA also produces the PKT-1 -- a TAPR TNC 1 clone -- and the PK-64 designed especially for the Commodore 64 computer.)

GLB Electronics, Inc.
151 Commerce Parkway
Buffalo NY 14224
(716) 675-6740

Model TNC-2A, Kit form only. Factory direct. (GLB also produces the PK-1 and PK-1L "software approach" assembled and tested TNCs.)

MFJ Enterprises, Inc.
PO Box 494
Mississippi State MS 39762
(601) 323-5869

Model MFJ-1270. Assembled and tested only. Available from dealers.

PacComm Packet Radio Systems, Inc.
4040 Kennedy Blvd., Suite 620
Tampa FL 33609
(800) 835-2246 Ext. 115 (orders only)
(813) 689-3523 (technical/service info)

Model TNC-200. Assembled and tested/Complete kits/Partial kits.
Factory direct.

Therefore, assured of the continued availability of high quality TNCs at reasonable prices, TAPR has ceased production with TNC 2 order #1200 (s/n 3721).

TAPR will continue to support software development for the TNC 2 as well as the earlier TNC 1. Other ongoing projects include the TAPR NNC (a networking controller), higher-speed modems, packet satellite support, and other areas of packet development. If enough demand exists, TAPR may make bare boards (no parts) available to experimenters. TAPR has no new TNC hardware products in development at this time.

We invite you to become a member of TAPR, and to attend the next annual membership meeting in Tucson on February 8th, 1986.

TAPR wishes to extend its heartfelt thanks to you, the Amateur community, for your strong and continuing support.

M 18522 Tom Clark (W3IWI,2976) 12/ 1/85 2:00 AM L:3
KEYS:/TNC2/C10 REPLACEMENT PART/TRV RADIO SHACK/
TO: (Group 95)

For those of you looking for capacitors to replace C10 on the TNC2, you might want to check Radio Shack Part # 272-1027, 50 uf @ 35V, which fits the board like it was made for it. The price is \$0.69

M 18523 Tom Clark (W3IWI,2976) 12/ 1/85 2:07 AM L:17
KEYS:/BUG REPORT/KANTRONICS REV 1.6 SOFTWARE/AEA PK-64 TNC/
TO: (Group 95)

This is an inquiry to see if any of you have noted the following anomalies in the Kantronics and AEA PK-64 TNC's:

Kantronics with rev 1.6 software has been observed to go into a mode we have humorously dubbed "stuttering". A packet is sent by the Kantronics, acknowledged by the receiving station, and then resent exactly the same, something like

This is a test 1234 (packet sent and acked)
This is a test 1234 (packet is re-sent again, despite ack)

AEA PK-64: twice we have seen a packet with FRMR errors sent by PK-64, both times when connected to an 'RLI BBS. In one case it was sent to me where it was detected by a TNC2, and in the other case it was detected by W3VH using a Kantronics. The BBS sorta chokes when this happens 'cuz it doesn't really know how to cope with a FRMR error message!

73, Tom.

C2973 CC45 Phil R. Karn (ka9q,2979) 11/24/85 8:04 PM L:168
KEYS:/SOME THOUGHTS FROM W3HCF/

Date: 24-Nov-85 05:23:37-UT
From: mlls@dcn6.arpa
Subject: Essay for the Digital Committee
To: packet-radio@mt-oddie.arpa

folks,

There have been many informal discussions recently on the issue of "level-three" or "long-haul" protocols. The ARRL is planning meetings which will both create and solve problems in this area. Phil Karn is trying to drum up support for these meetings in general and for IP/TCP in particular. Like some of the rest of us, Phil has learned a few lessons actually building and using high-flake networks that bear a strong resemblance to those likely to be built by the amateur community. On the other hand, there is a strong lobby,

including mostly those who have built low-flake commercial networks and those who have built no networks at all, who display incandescent X.25/X.75/X.121 bumper stickers.

Personally, I think that conflict between the two lobbies is silly and that both communities can co-exist quite handily, as long as care is taken in the architecture. The best existence test might be the DARPA Internet, which includes X.25 nets, Ethernets and all kinds of others, even AX.25 nets, right now. However, I am worried that some zealot might cop off something silly at one of these meetings and that may result in shutting down some very useful options.

Accordingly, I herewith break my promise to confine mutterings to my own swamp and offer the following essay. You should understand the opinions are definitely my own and that the exposition is intentionally tart. My hope is to get you all mad in the first five minutes after reading it, assuming you survive that trip. Please do not compose a reply during that interval. Then, I hope that you will think through the issues and direct butials and rebuttals not at me, but at the members of the ARRL Digital Committee.

On the Standards Process

Research tends to expand the number of options, while standards tends to decrease them. One should push on either one until the rate of increase equals the rate of decrease and so that the total number results in a healthy and vigorous community.

Amateur radio is after all a recreational community, a fact which some of our more aggressive special-interest groups sometimes forget. As technology matures standards often work to encourage new entrants and to stabilize exploitation, with the amateur satellite community being a good example. Pre-emptive efforts to standardize, especially in a recreational community, would work to discourage innovation, enthusiasm and participation in the standards process itself. Volunteer standards (e.g. bandplans) work only if there is a clearly defined benefit which extends beyond the boundaries of the special-interest group. In other words, resist telling someone what's good for him unless he asks.

Any standards process that does not represent the consensus of a constituent majority or is opposed by a significant minority who may be bound by it will be unpopular, discredited or ignored, regardless of technical merit. Any standards process that attempts to restrict the scope of design, implementation and experiment must be thoroughly justified on engineering grounds. Political justifications are unacceptable. The notion that our community can't do something because the Europeans (or the Martians for that matter) won't accept it is too preposterous for comment.

Every standard has a definite life cycle from the point at which a need for it is identified, through the coordination and specification process, prototype implementation and testing, then a period of refinement and evolution until finally it is overtaken by a successor. A standard must never attempt to stifle the evolution of successors; in fact, it must encourage it. One of the implications is that every packet header must include a protocol identifier and version number, so that different protocols and versions can co-exist in the same system.

Any network-level standards proposed for use in the amateur packet-radio community must address the issue of the radio channel a-priori. An "amateur" standard requiring, for instance, use of X.25 or SLIP on wire links between local-area gateways, is completely out of scope. Such would not be an amateur packet-radio standard, merely a bilateral agreement between the gateway operators. The amateur community is best served by concentrating on the engineering problems and their solutions with respect to radio issues and only secondarily on the more well-studied non-radio issues. The Manufacturing Automation Protocol suite is a good example of how to resist the urge to reinvent the wheel.

General Assumptions

While the existing CSMA/FM technology has little going for it on pragmatic engineering grounds, its widespread use is a fact. The AX.25 frame-level procedures are certainly useful, but badly matched to the CSMA/FM channel characteristics. Much can be done to improve operational procedures to reduce congestion and improve throughput, including the use of multiple channels and cross-channel bridges. However, development of the long-haul system must not pre-empt such improvements.

The existing organization can be described as a datagram network with stateless repeaters and reliability provided by end-end resequencing and retransmission. It may happen that some long-haul systems will include internal provisions for resequencing and retransmission in order to improve performance. However, such provisions must not obsolete existing end systems and protocols. Specifically, this requires an overall system specification on maximum permissible delay.

Datagram routing between end systems is presently determined by an explicit indication of source route in every frame. Pragmatically, this can be justified by the fact it works reasonably well in local-area systems where there are limited choices of available routes and the number of hops is small. It may happen that sophisticated routing algorithms will be developed for use in some local areas; however, a long-haul system must not presuppose this.

Development of the long-haul system must not depend upon a particular choice in addressing or routing semantics used in a local area and must not require changes in existing local-area procedures when working other stations in the local area. This implies the long-haul system must be able to interconnect existing Vancouver and AX.25 communities and possibly others that may come along, even if they share the same radio channel.

On Datagrams vs Virtual Circuits

Experience in the education, research and development community suggests the use of an internetworking protocol and addressing paradigm based on either the DARPA or ISO connectionless protocol suites. In this model end-end connectionless (datagram) service is the primary communication mechanism, with reliability achieved through the use of end-end internet virtual circuits, perhaps supplemented by intranet virtual circuits. Gateways between connectionless networks are stateless and operate only in datagram mode, so are relatively simple.

Experience in the common-carrier community suggests the use of an internetworking protocol based on the X.75/X.121 protocol suite. In this model connection (virtual-circuit) service is the primary communication mechanism, with reliability achieved through the use of concatenated virtual circuits between the gateways. Gateways between connection networks must preserve state for each individual end-end virtual circuit, so are relatively complex.

Given the present flux in design philosophy and opinion, it is inappropriate for the views of either community to dominate the standards process. The standardization, design and implementation of long-haul amateur packet-radio systems should not preclude access from either community to the other, perhaps via strategically located protocol-translation gateways. Furthermore, the basic long-haul transport mechanism must provide for both connectionless and connection service on an end-end basis. Many examples of how to do this are apparent in the DARPA Internet system.

On Interoperability

There are now and will be in the future numerous opportunities to proliferate access to and between amateur packet-radio systems via public and private nets including, but not limited to, the DARPA Internet, VAN nets (Telenet, etc.), BITNET, USENET, MAILNET, CSNET and others. In many cases the access must be controlled on economic or policy grounds. This is a very tricky issue in view of the individual policies of these nets and the government regulations under which the Amateur Service operates. In fact, the duly approved use of one or another of these nets or even ordinary dial-up modem connections may be a useful alternative to a strictly Amateur-Service backbone trunk in some cases.

The most important factor in these issues may be the need for survivability and interoperability in case of civil emergency or disaster communications. The standards process must consider these implications with respect to interconnecting to other link technologies, for instance, an HF link as backup for a 220-MHz multiple-hop backbone or an XMODEM or KERMIT dial-up link as a bridge between mail forwarders.

Note very carefully that these factors must not be allowed to advance the cause of any particular protocol, such as X.25, Internet or XMODEM, without considering the entire protocol suite of which this protocol might be a component. It makes no sense to blindly speak X.25 on the basis that "everybody does it" without considering what applications above X.25 that the emergency-communications community will need and have available.

C2973 CC46 Phil R. Karn (ka9q,2979) 11/30/85 10:25 PM L:17
KEYS:/CURRENT TCP HAPPENINGS/

In case anybody's interested (Jack, are you out there?) someone has ported the MIT TCP/IP package originally written for the IBM PC over to the Macintosh. I understand this is in the public domain, since it was posted on USENET. I'll fetch it and figure out how to get it to anyone who's interested.

My own code has now been tested on several processors, including representatives from the Big Endian family (68K) as well as Little Endian (8088) in order to flush out any byteordering bugs. The TCP is stable. Recent additions include a common "socket-like" programming interface (net open, net send, net recv, net close) and support for the User Datagram Protocol (UDP). UDP is not yet tested. Several others on the East Coast are currently active in porting my TCP to several other machines, including the Commodore Amiga. More as it develops.

Phil

C2974 CC103 Skip Hansen (WB6YMH,2964) 11/24/85 1:49 PM L:29
KEYS:/9600 BAUD STUFF/

Two K9NG modems are mostly on the air in Southern California. We have exchanged packets between Brea and P.V. about a 40 mile path using midland 13-509's on 220.95. The modems fired up on the bench the first time. A few problems were noticed however:

1. Midland 13-509's hear themselves on 220.95! Critical retuning of the oscillator cures this problem. (or just puts it off maybe?)
2. 220.96 seems to have voice traffic on it. (boy never ran into this before have we?)
3. The PTT and DCD Led drivers on the TNC-1 are from before the modem disconnect connector so they are inoperative when the 9600 baud modem is plugged in. (This was easily fixed with an Exacto knife.)
4. The DCD circuitry thinks our squelch noise is carrier most of the time. Changing C18 from a .047 to a .1, removing R30 and D3, and jumpering the emitter of Q6 to C18 helps greatly. At this point DCD falsely about 2 to 3 times a second for a couple of milliseconds. I am not at all happy with this mod, but it does allow the transmitters to transmit.

We are in the currently in the process of replacing the Midlands mechanical TR relay with PIN diodes and transistor switching of the receiver and transmitter voltages.

Does anyone have any ideas on the DCD problem?

73's Skip WB6YMH

C2974 CC104 Skip Hansen (WB6YMH,2964) 11/30/85 6:54 AM L:28
KEYS:/MORE 9600/

Well the problem I reported in an earlier message with the DCD output turned out to be the deemphasis circuitry in the receiver rolling off the high frequencies too much. After I removed the deemphasis cap the DCD stopped falsing. And we connected successfully! The error rate seems good, at least 80 % of the packets are getting there on the first try. We are still using the relay switching on the Midland's and hope to be getting some PIN diodes to play with soon. I am using an coat hanger ground plane inside of the shack with 10 watts talking to Brea (about a 40 mile path).

Midland 13-509 mods so far:

1. Cut C42 deemphasis capacitor out of the circuit.
2. Take the Disc. feed for modem from the junction of R26, C41 and C39.
3. Cut R110 to remove the phase modulator input from the transmitter.
4. Remove one of the fixed capacitors which is in parallel with the transmitter trimmer capacitors and replace with a MV2111 varicap.

5. Connect a 10k resistor from the modem output to the hot side of the varicap.
6. Bypass the junction of the 10k and the modem output to ground with a .001 cap as close as possible to the resistor.
7. For a keyed to ground PTT signal remove Q2 from the modem and jumper the collector of Q3 to PTT. (This is just a temporary stop gap to test the setup while we get the PIN diode switching built).

Well WB6YMH-1 and WB6KAJ-1 are on the air at 9600, where's the crowd ?

73's Skip WB6YMH

C2974 CCI05 Lyle Johnson (WA7GXD,2973) 11/30/85 8:23 PM L:139
KEYS:/NNC SOFTWARE DEVELOPMENT/PLEASE SPREAD THE WORD/HELP WANTED/

To: All Interested Packeteers

Fm: TAPR

Re: NNC Development and Testing

As many of you are already aware, the new TAPR Networking Node Controller (NNC) is nearing completion of prototype hardware debugging. The NNC is a four-port packet controller with a large memory area, direct-memory access (DMA) capability for I/O -- and Z-80 software compatibility.

To dispell any rumors, there presently exists NO SOFTWARE for this device. None. Nada. Ayn. Zip. Zero. Effes. Klum. { }

What we are looking for are volunteers to assist in developing software for this device.

We need low-level, highly-efficient drivers for the I/O. We need an AX.25 Level Two handler that can handle multiple logical and physical channels. We need Level Three and Level Four. We need loaders for uploading software updates to a remotely-sited NNC. We are hoping that there will be early porting of multi-port digipester code to this unit as well as a W0RLD PBBS. We need close coordination of the various aspects of the development. We need... You get the idea.

The hardware should be verified during December. If all goes well (it usually doesn't), we will want to put Alpha units in the hands of developers in late January/early February. Assuming a couple of months to get enough software together to make Beta testing meaningful, we will be looking for Beta testers in the March-April timeframe. Once testing has advanced to the point of reasonable confidence, we will make the units generally available (summer of 1986?).

Now, we are NOT looking for folks who want to be the first kid on the block with a new toy. We need people who are committed to Amateur packet radio and want to help make a meaningful contribution to a very large and difficult task.

And be forewarned. You may slave away for many, many hours, only to have your code not used, or superseded, or... No guarantees.

Coordination is going to be a tough assignment. Without proper coordination, a lot of wheels will spin, and a lot of energy wasted in duplication of efforts. A BBS to swap code modules will be needed. All code will need to be carefully, accurately and exhaustively documented -- by the author!

Developers will need to procure the following:

- 1) One NNC digital unit - projected cost is \$175. This is an NNC with UP, 64k bytes of bDRAM, 32k bytes of EPROM, four HDLC ports, two parallel (centronics compatible) ports, two async ports and one SCSI interface. The SCSI chip may not be included at this price, we are not sure yet, but for the Alpha testers/developers it will be. This unit will be fully assembled and "tested."
- 2) One NNC Floppy Adapter - projected cost \$125. This includes a DMA'd Floppy Controller that can handle 4 diskette drives. This unit will NOT support 8" drives (lack of 8" support is intentional). The price includes a licensed copy of Z-DOS, a CP/M 2.2 compatible operating

system. It will be on 5.25" double-sided 48 tpi diskette format capable of 368k bytes (formatted). If the decision is made up front to use 96 tpi drives, TAPR will copy the licensed diskette to the denser format and supply the original as well as the high-density copy to the purchaser. A pair of 5.25" floppy drives. Maybe we can do a group purchase of TEAC 55Bs. Figure \$150 for this expense. 48tpi or 96tpi are about the same price. 48 tpi yield about 400k formatted bytes; 96 tpi about 800k formatted bytes.

- 4) A power supply. \$50 from surplus sam?
- 5) One NNC Modem board - projected cost is \$150. This is a wired and tested board which includes one 300-baud 2206/2211 modem with tuning indicator and three 1200-baud 2206/2211 modems. We might get this cost down to \$125.

Thus, there is a cost of participation that will be a minimum of \$450 and may be \$650. Add to this the cost of an assembler or compiler...

The assembler that seems to make the most sense is ZAS, from Echelon systems. Again, we can probably do a group purchase or multiple-site license for this project. This assembler supports the extended instruction set of the HD64180 cpu. There is no reason to limit ourselves to the 280 instruction set (or - yeech - the 8080 subset) for this project. And ZAS is fairly cheap - about \$50, I think.

I don't know which C or Pascal compiler will be chosen. I assume that one will be chosen, so the high-level code can be written in a transportable high-level language (makes for easier testing?) while the interfaces to the hardware can be done in assembly language. Preferably, the compiler will generate Z80 (or 64180) source code for assembly by ZAS. This allows hand-optimization of the compiler output.

By standardizing on the development environment (NNC w/5.25" floppies) and the tools (assembler, compiler(s)), we hope to make it easier for all participants to share their work amongst the group.

It is expected that all code (including source code) developed for this project will be placed in the public domain for non-commercial use. And that TAPR will be given explicit (not exclusive) right to distribute it.

If you have the time and ability and want the chance to make a real contribution to Amateur packet radio networking development, please leave a message on DRNET or write the TAPR office. We will put you on file and notify you when we are ready to get started with Alpha test or Beta test (as you indicate to us).

For Alpha test, we need developers. Committed developers. People who really understand software design, hardware/software interaction, protocol implementation, code size/speed tradeoffs, data structures and myriad other facets of software design. And of course, understand networking...

For Beta test we need testers. People who are in a real packet environment, who have a good site that will get plenty of exercise on the air, who have the time and commitment to submit detailed reports of what works and what doesn't. This isn't a "be the first person on your block to own an NNC" contest; it is going to require work.

What do we mean by commitment?

Consider a plate of bacon and eggs. The chicken was actively involved; the pig was committed.

If you are a capable packeteer, committed to assist in networking development, please provide us with the following:

- Full Name.
- Amateur Callsign.
- Mailing Address.
- Daytime telephone number.
- Evening telephone number.
- Alpha or Beta test.
- TAPR membership number (if applicable).

Specific areas of expertise that you wish to make available to this project (low level interface/high level protocol implementation/documentation/testing/etc.)

13

Thank you for you help. Happy packeting!

C2987 CC239 Howard Goldstein (N2WX,2987) 11/26/85 3:17 PM L:30
KEYS:/RELEASE 1.1.1J AVAILABLE/+READ THIS ITEM/FOR 16K RAM ONLY/

To: Tiny
Fm: Howie N2WX
Re: 1.1.1j (\$0B checksum)
Dist: Beta testers
Please +READ C2987 CC239 to get .HEX for 1.1.1j.
CHANGES:

- o- Headers no longer displayed from connectee while MCON and MON ON
- o- Transparent echo no longer occurs
- o- LCOK, ESC repaired
- o- BHeard removed, got plenty of negative comments on that one!
- o- NULL handling totally revamped, no longer are nulls buffered
- o- New command LCStream (default ON) performs a "toupper()" on stream selector the user issues
- o- Strange, seemingly random happenings to link state hopefully corrected.
- o- CMSG and CTEXT handling changed; before, CTEXT would only go out on the current input stream. Now CTEXT goes out on the newly connected stream SO LONG AS
- STREAMSWITCH is NOT 0 !!! (and of course, CMSG is ON)
- o- and finally, true break escape to 'cmd:' mode from transparent works better now, doesn't send out the packet with a single 0x00 byte

A final note, this release hasn't been thrashed at 9600 baud yet so please do do thrash it if your capable and report results back to the conference!
73 Howie

C2987 CC240 Howard Goldstein (N2WX,2987) 11/28/85 10:16 AM L:26
KEYS:/PORTS/MEMORY/ASSIGNMENTS/CAVEATS/

to: All (Paul pls correct if I messed up)
fm: Howie N2WX
re: Port, memory assignments TNC 2
dist: open

RAM and EPROM on the TNC are mapped as thus:

EPROM starts at 0x0000 and goes up
bBRAM starts at 0xFFFF and goes down

On reset or power on clear the PC is loaded with 0x0000

Ports:

SIO A dat 0xDC
SIO A ctl 0xDD
SIO B dat 0xDE
SIO B ctl 0xDF

Hardware signal driving SIO syncB* is 600hz symmetric

C2987 CC241 Tom Clark (W3IWI,2976) 11/30/85 2:34 AM L:10
KEYS:/HOWIE/RE:LATEST CODE/A FEW QUESTIONS/
A: 239

Howie, downloaded the HEX for the latest software rev and noticed that you exactly filled it to the 16k boundary (according to the last line of the hex dump). Is it possible that the length is exactly 16k or is there some code missing. I haven't tried burning it and testing it yet. Sorry you pulled BHEARD YIN out -- the folks around here like it! Re the VC X.121 code, in order to get someone else to try it with, I'm going to have to "break" the sanctum sanctorum of the "beta" group. Any objections if I make it available to a few selected others locally for testing?

73, Tom

C2987 CC242 Howard Goldstein (N2WX,2987) 11/30/85 8:22 AM L:12
KEYS:/1.1.1J SIZE/BHEARD/SAREX2/NON BETA NETWORK TEST/
A: 241

Tom - Right 1.1.1j fills a 27128 or 2 64s exactly to the limit no problem there.

BHeard is gone...but not forgotten! The SAREX2 version does it but it may not have been suitable for general use it could encourage every jack in a mineshaft to do a heard beacon thru 8 digis.

I don't have any big problem with the network release being tried by non-betites provided they know it ain't done and there are known problems. With that in mind though I'd be pleased to have it thrashed about!

73 Howie

C2987 CC243 Tom Clark (W3IWI,2976) 12/1/85 2:14 AM L:6
KEYS:/HOWIE/A COUPLE OF QUESTIONS ABOUT 8K CODE/

Howie, another question. Do you plan an 8k release with the latest goodies (or most of them) -- perhaps fewer multi-connects? The last 8k release you sent out (about 6 weeks ago) was pretty bullet-proof. Any problems if I make it available to locals here? The hardware handshaking and a couple of other fixes really do improve BBS operation and these guys wonder why mine works so well when theirs doesn't!

M 19111 J. Gordon Beattie Jr. (N2DSY,2990) 12/3/85 7:21 AM L:5
KEYS:/TNC 2 REV 1 MOD NEEDED ASAP I/
TO: (Group 95)

Has anyone published a modification for the rev 1 TNC2s so that they can support the 27256 like the rev 2 boards can?
This is needed ASAP!
73, Gordon

M 19181 Lyle Johnson (WA7GXD,2973) 12/3/85 11:16 AM L:6
KEYS:/TNC 2 REV 1 MEMORY MODS/
TO: (Group 95)

Gordon,
complete mods were published in the October PSR. Just add the following steps. 1 - cut the trace from u24 pin 26 to wherever it goes. 2 - add a trace (jumper) from u24 pin 26 to u24 pin 28.
That's all there is to it! (see how useful PSR can be?)
Lyle

M 19455 Rich Amundson (WA0JFS,2965) 12/3/85 11:38 PM L:19
TO: (Group 95)

TO: GROUP 95
FROM: RICH AMUNDSON
RE: X-820 RLI HANDSHAKING PROBLEM

TO HELP THE IOWA TRANSITION TO 145.01 ON DECEMBER 1, I IMPLEMENTED THE GATEWAY FUNCTION WITH ONE PORT ON 145.01 AND THE OTHER ON 147.555, BOTH AT 1200 BAUD TO KEEP THE STAGGLERS IN TOUCH UNTIL THEY CAN QSY. ON DOING THIS HOWEVER, THERE RAISED ITS UGLY HEAD A HANDSHAKING PROBLEM THAT MANIFESTS ITSELF AS A FAILURE TO SEND THE 'Q' AS SUCH TO TURN ON THE COMPUTER AGAIN WHEN SENDING A LONG FILE. THEN ALL THE CONNCTEE CAN DO IS LET THE BBS TIME ITSELF OUT AND LET IT RESET WHICH IT WILL DO AND EVERYTHING SEEMS OK TILL THE NEXT PERSON TRIES TO DO THE SAME OR ANY OTHER LONG FILE. BY LONG I MEAN ANYTHING OVER ABOUT 12 OR 14 LINES OF TEXT.

THE HARDWARE IS A "STOCK X-820-1" TWO TNC-1'S AND ASSOCIATED RF GEAR. ALL OF THIS GEAR WAS USED BEFORE IN THE SINGLE PORT BBS SO I AM STARTING TO SCRATCH MY HEAD.

ANY IDEAS WHERE I SHOULD LOOK TO SOLVE THIS PROBLEM? ANY SUGGESTIONS WILL BE APPRECIATED AND PROBABLY TRIED.

THANKS WA0JFS

M 19469 Lyle Johnson (WA7GXD,2973) 12/ 4/85 12:18 AM L:19
KEYS:/TNC 2 REV 1 OWNERS/ANNOUNCEMENT/FOR GENERAL DISTRIBUTION/
TO: WA7GXD, (Group 95)

TO: TNC 2 Rev 1 Owners
Re: Rev 2 Upgrades

Noting the improvements made in the TNC 2 Rev 2 design, many of you have contacted TAPR requesting information on obtaining parts for the various upgrades listed in the October, 1985 PSR Quarterly.

After listening to your calls and reading your letters, we are pleased to announce that we are ordering sufficient parts to send to every TNC 2 Rev 1 owner a "care package" consisting of the 27C256 EPROM, second 8k static RAM, RF Chokes and miscellaneous capacitors, along with a corrected copy of the PSR article.

If all goes well, the package should arrive in time to be a stocking stuffer.

The price? Hey, this is TAPR. There will be no charge...

Thank you for your support. Happy holidays from TAPR!

M 19479 Tom Clark (W3IWI,2976) 12/ 4/85 1:41 AM L:66
KEYS:/SAREX2/SHUTTLE PACKET EXPERIMENT/INFO UPDATE/
TO: (Group 95)

The following is from the W3IWI packet BBS for info:

W3IWI at 851204/0531: Last msg # 218, 98 active msgs
(B,D,G,H,I,J,K,L,R,S,T,U,W,X) >
Msg# TR Size To From @ BBS Date Title
192 3N 2919 ALL W3IWI 851204 SAREX2 demo

Many of you are aware that we are hard at work to get SAREX2 built. SAREX2 is an acronym for Shuttle Amateur Radio Experiment; SAREX1 was the slow-scan TV that W00RE used earlier this year.

SAREX2 is to be a packet radio package consisting of a flight-hardened TAPR TNC2 coupled to a Radio Shack Model-100 lap-top computer and the same Motorola "MX"-series HT used on previous amateur radio shuttle flights.

We are striving, pending approval from NASA, to have this hardware carried by Ron Parise, WA4SIR when he flies on mission 61E taking off March 6, 1986. The crew working on hardware & software to make this happen are located in Maryland, Arizona, Florida, Texas, Arizona and Iowa.

We now have prototype SAREX2 software operating on 145.05 in the Balto/Wash area under the call W3IWI-5. It is under test to see if local users can make it croak! It has several unique features:

ROBOT -- This is an automatic QSO machine that will work you and assign you a unique serial number (in hex) for your QSO, and then disconnect.

WORKED beacon -- If you successfully complete a QSO, your call and serial will appear at the top of the "WORKED" beacon list. For local testing this (and other) beacons are being sent every 15 minutes, if flight they will be repeated every 15 seconds or so.

HEARD beacon -- This beacon begins with a beacon sequence number (to help piece the log together in flight) and lists the calls heard most recently.

A normal beacon (currently addressed to SAREX2) is also used to send a brief (up to 120 bytes) information packet.

A "meta-beacon" is also available (but is currently turned off) to send up to 1.7 kbytes (7 * 255 bytes) of information. It is planned that this feature will be used in flight to downlink a mission status bulletin every couple of minutes or so.

These features have been designed to permit a large number of packeteers to experience the thrill of space communications even if WA4SIR is not personally available.

During the mission, some time will be reserved for special packet tests including an orbital demo of store-and-forward communications (a la PACSAT); software to support this special mode is to be housed in the Model-100.

In addition to the Balto/Wash W3IWI-5 tests, WA0JFS and W0RPK are planning an aircraft demo/test over the midwest in early December.

The ROBOT supports multiple QSO's simultaneously. Balto/Wash users are invited to become abusers and to try to crash the test software. Gang up on W3IWI-5. Lambast it with simultaneous packets. Try to make it croak. Make my day!!! Meanwhile, W3IWI-5 will also continue to serve as a local coverage digipeater from its location at NASA/Goddard in Greenbelt.

Reports on how it works will be appreciated. Especially solicited are bug reports which should contain as much info as possible on what happened. It's a lot easier to fix it on the ground than when it is flying in orbit!

73, Tom

M 19480 Tom Clark (W3IWI,2976) 12/ 4/85 1:52 AM L:95
KEYS:/A MONTH IN THE LIFE OF THE W3IWI PBBS/THINGS ARE GROWING FAST!/
TO: (Group 95)

The following is from the W3IWI BBS. I thought some of you might like to see some statistics on how busy things can be and how fast activity is growing -- 73, Tom

I have just posted the November user summaries as the files SUM-NOV.DAY and SUM-NOV.USR. There were 163 different users this month (a new record) and the system was busy some 32% of the available time. This month the reliability was lower (92% availability) than I would have liked due to a number of power transients in the middle of the day which killed things until I could get home. Another record was that a total of 1124 messages "flowed" thru the system, an average rate of 1.7 messages per hour.

Since the BBS went on in Sept. 1984 we have now handled over 10,000 messages. This milestone necessitated minor surgery in that W0RLI software cannot cope with 5-digit message numbers. We have now had to start message numbers over from scratch since we joined the 10k club.

I have noticed that late in the month we were seeing 1-3 new users each and every day. Several indicators show that activity is doubling every 4-7 months. These include the number of users, the number of messages handled, and even hasse factorial. One of those indicators is the sheer volume of logging data generated by the system which is summarised in the following:

Log file	Size	0	50	100	150	200	250k
LOG-SEP.84 = 11008	-----	-----	-----	-----	-----	-----	-----
LOG-OCT.84 = 43136	-----	-----	-----	-----	-----	-----	-----
LOG-NOV.84 = 81920	-----	-----	-----	-----	-----	-----	-----
LOG-DEC.84 = 96512	-----	-----	-----	-----	-----	-----	-----
LOG-JAN.85 = 114688	-----	-----	-----	-----	-----	-----	-----
LOG-FEB.85 = 97024	-----	-----	-----	-----	-----	-----	-----
LOG-MAR.85 = 126080	-----	-----	-----	-----	-----	-----	-----
LOG-APR.85 = 100608	-----	-----	-----	-----	-----	-----	-----
LOG-MAY.85 = 137088	-----	-----	-----	-----	-----	-----	-----
LOG-JUN.85 = 115200	-----	-----	-----	-----	-----	-----	-----
LOG-JUL.85 = 92800	-----	-----	-----	-----	-----	-----	-----
LOG-AUG.85 = 163584	-----	-----	-----	-----	-----	-----	-----
LOG-SEP.85 = 200320	-----	-----	-----	-----	-----	-----	-----
LOG-OCT.85 = 210816	-----	-----	-----	-----	-----	-----	-----
LOG-NOV.85 = 217984	-----	-----	-----	-----	-----	-----	-----

Hope you find these statistics interesting.

73, Tom

SUM-NOV.DAY file:
W3IWI MailBox/GateWay Daily Usage Statistics for the Month of November, 1985

Connects vs. Time-of-Day vs. Date

Da	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Totl
1	2	4	8	4	5	4	1	2	.	1	4	4	3	2	1	6	3	3	3	1	3	.	4	4	72
2	2	4	5	5	6	4	1	1	.	1	1	1	3	5	4	1	2	3	5	1	4	2	5	3	69
3	2	2	5	2	3	4	2	2	2	3	1	2	4	5	2	3	2	2	4	2	3	4	6	3	70
4	.	2	4	3	3	3	.	.	1	2	1	1	3	1	<-----	off the air	<-----	off the air	<-----	off the air	<-----	off the air	<-----	off the air	24
5	5	.	.	1	4	1	3	3	2	2	.	2	3	.	1	4	2	3	1	.	2	2	4	5	50
6	3	2	4	6	5	.	2	3	1	.	2	1	1	.	1	4	.	3	2	2	4	1	1	1	49
7	4	5	2	3	3	1	1	2	.	1	.	2	3	2	1	.	1	.	3	2	2	4	4	4	46
8	5	2	6	2	3	2	1	.	.	2	1	4	1	4	1	1	2	1	1	2	1	.	2	4	47
9	7	4	3	2	4	4	.	.	.	4	4	1	1	1	1	1	1	1	3	4	2	5	3	5	62
10	1	1	5	4	2	2	3	1	.	1	2	<-----	off the air	<-----	off the air	<-----	off the air	<-----	off the air	<-----	off the air	<-----	off the air	<-----	22
11	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	12
12	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	37
13	6	2	12	4	3	1	3	2	1	2	.	1	3	2	2	1	1	2	1	2	3	2	1	3	8
14	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	<-----	off	52
15	13	6	3	4	6	3	2	1	.	1	1	.	1	1	1	2	5	5	2	3	4	1	4	5	74
16	6	4	3	9	7	3	.	2	.	1	3	5	4	1	4	3	4	2	1	2	3	5	3	5	75
17	2	5	4	1	4	6	7	2	2	1	1	1	2	6	4	2	4	3	3	7	2	5	5	4	83
18	3	5	4	5	2	4	4	1	1	1	1	4	1	3	2	2	4	1	1	<-----	off	<-----	off	<-----	2
19	6	4	6	6	1	2	.	2	1	4	7	1	.	1	2	1	2	3	1	.	2	6	3	6	67
20	3	5	4	3	3	5	.	1	.	1	5	2	.	1	1	2	7	1	.	3	2	4	.	4	56
21	.	7	6	4	4	3	2	1	1	.	4	3	4	1	.	5	<-----	off	<-----	off	<-----	off	<-----	off	45
22	4	3	4	9	4	3	2	.	1	1	.	4	5	.	1	1	2	3	12	5	3	6	3	78	
23	3	4	4	5	10	.	.	2	.	1	1	1	.	2	2	3	2	.	2	3	4	6	3	59	
24	3	5	6	4	5	7	1	2	1	.	1	1	3	.	3	2	3	4	3	6	5	3	3	70	
25	1	5	2	7	4	6	1	2	1	.	1	1	1	2	3	3	2	3	2	5	4	4	4	5	69
26	7	6	6	4	2	3	1	2	1	.	3	3	1	2	1	1	1	2	4	1	2	2	2	2	58
27	2	3	5	5	3	3	5	2	1	3	3	3	.	3	3	2	3	4	2	3	5	4	4	74	
28	5	3	5	3	1	1	3	3	2	.	1	3	4	4	4	4	4	4	3	5	5	2	5	2	75
29	2	5	4	3	2	5	3	1	.	1	2	7	2	6	3	<-----	off	<-----	off	<-----	off	<-----	off	<-----	60
30	3	1	7	4	3	5	1	2	2	.	1	1	1	.	.	2	6	5	2	5	4	3	9	67	
100	125	114	90	42	21	37	69	55	57	64	60	66	97	92	1721										

Total Time Available : Approx 652 hours = 91.4% reliability
Total System Connect Time: 12487 minutes (208 hours, 7 minutes) = 31.9% of avail.
Average Time per Connect : 7.255665 minutes
Average User Connect Time: 76.60736 minutes
Total number of users : 163
Average connects per user: 10.56

I won't bore you with the individual user statistics in the file
SUM-NOV.USR. Hope you found the material interesting. 73, Tom

M 20849 Rich Amundson (WA0JFS,2965) 12/ 7/85 10:04 PM L:15
KEYS:/SAREX2 TESTING/
TO: (Group 95)

TO: HOWIE, TOM CLARK, LYLE

FROM: RICH AMUNDSON

RE:SAREX2 TEST

W0RPK AND I HAD THE BETA TEST SOFTWARE ON THE AIR FROM THIS QTH FOR AN HOUR TONIGHT AND HAD OVER 400 CONNECTS. NOONE WAS ABLE TO MAKE IT BURP OR EVER BREATHE HARD. ONLY OCCASIONALLY DID IT MAKE IT INTO THE FOURTH LEVEL. IT LOOKS GOOD FROM THIS END HOWIE AND I DID GET RAPL THE INFO.

NOW, IF ONLY THE WEATHER WILL COOPERATE WEDNESDAY NIGHT, WE SHOULD BE ABLE TO GIVE IT A STIFFER TEST.

73'S AAND THANKS TO YOU ALL FOR GETTING THE INFO AND EPROMS TO US SO QUICKLY.

RICH WA0JFS

M 21003 Skip Hansen (WB6YMH,2964) 12/ 8/85 1:52 PM L:15
KEYS:/NNC SCSI HARD DISK CONTROLLER/
TO: (Group 95)

TO: Potential NNC software developers
From: Skip WB6YMH
Subject: Mass storage for NNC software development.

My company has a limited number of SCSI bus hard disk controllers available for ST-506 style hard disk drives. The controllers are DTC-510B's which are surplus to our needs, but are new. The price is \$60. There are several companies offering good deals on 10 Mb hard disk drives which would allow a 10 Mb hard disk to be interfaced to the NNC for around the cost of two floppies. I have written a CP/M 2.2 BIOS which supports a Segate ST-412 with this controller and would be happy to make available. If anyone is interested let me know. If nothing else it's a hell of a good way to make sure the SCSI port gets a good thrashing!

73's Skip WB6YMH

M 21120 Tom Clark (W3IWI,2976) 12/ 9/85 12:58 AM L:42
KEYS:/SAREX2 NEWS/FROM NORTHERN CALIFORNIA AND IOWA/
TO: (Group 95)

SAREX2 news

A brief note to tell you that SAREX2 software is now operating in California. I am in San Francisco on a business trip and brought my portable SAREX2 demo station with me. It has now been on the air for a bit over a day and has logged 80 QSO's with some 25 different stations on 145.09 operating thru the WD6CMU-1 digipeater.

73, Tom

Posted: Sun Dec 8, 1985 6:01 PM GMT
From: RWALLIO
To: tclark
CC: pacsat
SJSAREX-2ATESTINGeiniIOWan Iowa
Msg: PGIF-2329-2579

PROMs burned with Howie's SAREX-2 software arrived from TAPR and W3IWI on Friday last. One copy was immediately installed at W0RPK to get ready for a coordinated test which occurred this past Saturday evening. The other copy was installed at WA2GTM preparing for the aeronautical operation scheduled for this coming Wednesday.

The test on Saturday evening resulted in slightly over 400-QSOs in one-hour with about 10-stations participating. In slightly over an hour, the total QSO count was 425.

When I arrived back home from the WA0JFS test site, I found that the disk file I had opened had collected 90K-bytes of SAREX-2 beacons. This file, and what we collect on Wednesday, will be used for beacon processing program test data.

Plans for our aeronautical operation are complete and we are watching the weather closely. A last minute briefing will occur on the Tuesday evening AMSAT nets.
Ralph Wallio, W0RPK for CITS

[W3IWI note -- I apologize for the garble at the start of the Iowa report. This msg is being sent using a Model-100 which seemed to have gotten its handshaking fouled up. -- Tom]

C2973 CC47 Jack Brindle (WA4FIB,2963) 12/ 5/85 1:17 AM L:57

Phil; Yes, I am here, listening, and very interested. How do I get a copy? I will send an SASE REAL SOON NOW, as soon as I can crawl out from under my MacPacket/TNC2term development. Please give me your address again, I managed to lose it in the move up to Atlanta.

To those into the argument of space taken in systems, I have calculated the amount of space required for tables in a PVC type system. These same calculation could probably be extended to other systems as well (VCs & datagrams)

The X.25 network layer format allows a 12 bit Logical Channel Identifier (LCI). Using two of these bits for encoding packet priority, we then have a ten bit LCI. This allows for 1024 logical channels. This also means that in a PVC system we can have 1024 nodes (4096 if we use some other means to convey priority). Each node requires an entry in the node's routing table, consisting of the layer 2 channel to send the packet on to forward it to its destination. Thus each entry consists of one byte. There might be a second byte for alternate routing, or an alternate LCI could be used instead. This means that the outbound routing table would require a maximum of 1024 bytes of space. Inbound routing tables are also required for every node the present node talks to at the link layer. These tables consist of a single entry for the required LCI to forward the packet. The table is indexed by the inbound LCI. Thus the table would contain a maximum of 1024 entries each of which would be 10 bits in length. Since we are using byte machines, we shall assume that the entries actually use 16 bits even though the upper 6 bits are zeros. This means that we now need a table of 1024*2 bytes (2048 bytes) maximum for each node the current node talks with AT THE LINK LAYER. Being practical, we should only be able to connect directly to 2 or three other nodes. Our table requirements then would be 5 kilobytes for 2 directly connected nodes, or 7 kb for 3. In light of the current price of 8Kx8 ram chips, this will allow NNC ram to be used for message buffering. We now begin to see that we really don't need a lot of RAM in our NNCs for routing tables, and that the amount of ram is governed instead by the number of packets buffered before sending them on to their destination. This will not be much in our present AX.25 link layer protocol, but as we begin to go to higher data rates, we may wish to extend the possible maxframe values so that 127 packets may be sent in a group. This, indeed, is where our RAM space will be used.

Oh yes - those thinking that 1024 nodes is not very many in a system, it is when one begins to see packet as taking a regional approach, the way the ARRL traffic network does. I believe we will see regional networks that are bridged through system bridges and gateways. This will make the tasks of system upkeep and maintenance bearable, and keep network control "local".

One last thought. For those that believe that any hodgepodge of a system will do since "this is only ham radio", I urge you to take a look at what is happening in the radio packet networking commercial community. Several companies are pushing packet products for commercial use based on the AX.25 protocol (e.g. AEA, Kantronics and GLB, to name a few). This is not necessarily bad, but whatever protocols we decide on will probably get pushed onto the commercial users. Since each networking protocol has its good points and bad, and each is better used in specific systems, an end user may get stuck with a totally unsatisfactory system. It will probably be quite some time before any of the commercial folks realize this, but I bet it will upset a few. For example, a small company whose network is fixed doesn't need the versatility of a VC system (but a PVC system would work exceedingly well). I don't suggest that we design our systems based on the needs of others, but I do believe that the commercial folks better watch what they are pushing on the unsuspecting commercial world, lest they be overrun by a superior networking system. Remember, this is ham radio, and the commercial folks better remember that we do this for the enjoyment. Right Phil?

C2974 CC106 David Cheek (WAS5MWD,2966) 12/ 5/85 1:09 AM L:248
KEYS:/TEXTNET/NETWORK5/

An Introduction to Networks

part 5
by T.C. McDermott, N5EG
networks SIG, TPRS

Before we get far into the discussion of network software requirements, I would like to make a correction to one of the previous articles. We have chosen AX.25 as the link-layer protocol internal to the network, with the exception that the maximum data size is 512 bytes. Since the user of TEXTNET may generate a packet up to 256 bytes long, and since the network will overlay it's level-3 protocol onto that packet, then internal to the network packets larger than 256 bytes can exist. An alternative to this is to fragment packets, and it was decided that this was an unnecessary complication at this time.

In a previous article we saw that algorithms that assume slightly unreliable radio paths can be chosen to minimize the degradation in throughput suffered by packets (the HOP-TO-HOP algorithm, for example).

We have also seen that all the hardware that is really necessary to build a node includes 2 radios, 2 modems, and the node control processor (plus minor items like: sites, towers, feedlines, power, people to maintain hardware, money, time, etc.).

What then has delayed the introduction of networks to the amateur community? Simply, it the great level of complication in the software that is necessary to build a network. We will see that a network requires two layers of protocol, not one layer, as we use in the AX.25 link layer. What are the two layers of information, and what purpose do they serve?

Let's define some terms here, since we will use them frequently in the following discussion.

LAN : Local Area Network. This is the part of the network that the users are connected to the nodes through, usually on 2-meters, at 1200 BPS.

IP : Interprocessor. The part of the network that the nodes talk to each other on. usually on 220 Mhz., at 9600 BPS.

source_user : this is the Ham, using a TNC, that generates the original information to be transmitted. This Ham may have typed it in on a CRT, or may be sending a disk file, or it may be a BBS sending a message. It is the point where ASCII text gets translated to HDLC.

entry_node : This is the entry point to the network. When a HAM wants to use the network, this HAM will CONNECT to this node, via the normal method for the TNC to connect to anything.

exit_node : This is the exit point from the network. It is the place where the node is close to the desired ultimate consumer of the information. The information leaves the network, via AX.25 at this point.

dest_user : This is the destination user, the consumer of the information that is being transmitted. Just as source_user is connected to

entry_node, dest_user is connected to exit_node via a AX.25 link-level connection.

When you use a TNC to connect to someone, the AX.25 packet contains two key pieces of information, the source, and the destination. There is never any confusion here. Source and destination change whenever the direction of transmission changes. Also, since this is a link-layer protocol, there is never any confusion at to where destination might be located. If it is not within range of the radio, then no connection is ever established!

What is different about a network? For one thing, the network doesn't really "know" where the destination is. It must ask the source_user where to find dest user (or it might look up dest user in a table, but this gets complicated since users tend to move around a lot). So the network needs to know where to find dest user, and the answer is supplied as "dest user is located NEAR to a particular network node, called exit node". Now, it would be nice for dest user to be able to send information back to source_user, who happens to be located at entry_node. Thus when setting up a connection, we see that the network, prior to the exchange of user data, must establish where the users are located, so that it can send that data to the right place.

Several divergent opinions of how to get that user data to that place could now burden this discussion. Suffice it to say that we have chosen a particular method for TEXTNET for what we perceive to have a simple implementation method.

Our method is as follows:

1. Entry_node receives a packet from source_user.
2. The network uses the AX.25 fields to tell it who source_user is, and then strips off the AX.25 header.
3. It now adds a brand-new header, called TEXTNET IP3. (Interprocessor layer-3). This header contains the length of the data part of the packet, exit node, dest user, entry_node, and a one byte control field, followed by the packet.

which figures out which is the next node of the network that should get the message. This next node will obviously be one that is closer to exit_node than this node is.

5. An AX.25 header is now built onto the front of this big packet. As the source field in this header, it will contain our node name. As the destination, it will contain the name of the further-along node (that is adjacent to us) that was supplied by ROUTE.

6. This complete unit will now be transmitted at 9600 baud, using all of the rules of AX.25, to the next node.

7. The next node will strip off the AX.25 header after it receives the packet. It will examine exit_node to see if exit_node = our_node name. If it does match, then this node is the_exit_node, goto 8, else we are not the exit node, and the packet must be further propagated: Goto 4 to continue the propagation of the packet down the network.

8. When exit node is reached, the field dest_user in the IP3 header is examined, and the correct information found for that packet. The IP3 header is stripped off, and the correct layer 2 AX.25 information, with this node name being the source, and dest_user being the destination is formed. This packet is then sent using AX.25 methods to the destination user.

Although this sounds a little complicated, its really not. INSIDE the network, any packet starts with a layer-2 header specifying which are the immediately-adjacent nodes that are exchanging the packet. Next in the packet is the IP3 header, which contain the endpoints of the connection. Finally is the actual data itself. Note that we can place several different IP3-DATA sets within a single layer-2 envelope, as long as the different packets are going the same direction. Thus we have MULTIPLEXED packets from different users into a single layer-2 unit.

This method has some advantages. One is that HOP-TO-HOP acknowledge is explicitly a function of layer-2, since each node must acknowledge the receipt from the previous node by the AX.25 method. Secondly, an intervening node need only examine the exit_node field to decide if it needs to process the packet, otherwise the IP3 portion remains UNMODIFIED by that node. Layer 2 source and destination will be changed since the node that received the packet becomes the new source, and ROUTE will now supply a destination node closer to the exit_node.

The complete layer-3 protocol includes a few more details, such as a software state diagram to describe the exact method that the network uses to do everything, such as set-up and to tear-down a circuit. It also contains some instructions for handling error cases. The layer-3 machine does not worry about the reliability of the radio paths, that is the responsibility of layer-2. It does however check for inconsistent activities, and erroneous values in the control field of the IP3.

What does the control field contain? It tells us whether the information that follows is user_data (which it is most of the time), or whether the information that follows is supervisory information, for use ONLY within the network. The possible supervisory commands include these:

- Circuit establishment request
- Circuit establishment acknowledgement
- Circuit disconnect
- Circuit disconnect acknowledgement / or estab. failure
- Error - User transmission failure
- Error - Network transmission failure
- Traffic statistics request
- Traffic statistics response
- Congestion control - flow on
- Congestion control - flow off
- Special "fire code" sequence request
- Processor reset acknowledgement

The circuit supervisory commands allow the two endpoints of the network to exchange information about setting up or taking down a connection. When setting up a connection, the entry_node can tell the exit_node who source_user, entry_node, and dest_user are, and any digipeaters that exit_node may have to go through to get to dest_user. Exit_node will either be successful at setting up the connection to dest_user, or it will not. It sends back this result to entry node, so that source user can be notified.

One of the previous articles described the special hardware state-machine on each NCP card that will detect a long sequence of characters that obey HDLC coding rules and directly generate a reset pulse to the microprocessor. The "fire code" command is the way that the network makes sure that the node PRIOR to the node that needs to be reset, and that the node PRIOR to the target node will transmit the special sequence. Each node has a different state ROM, and thus a different sequence to reset it. Each node "knows" the code for its neighbors.

Congestion control can be a very complicated subject. An illustration of this point, assume that source user is generating packets quickly, and injecting them into entry_node. Entry_node routes them down the network to exit_node. Exit_node, however is having a difficult time trying to get the packets to dest_user. They get through, but there are a lot of collisions, and the leave exit_node slowly. Eventually, there will be a network congestion problem. User data will start filling up all of the available RAM at the intermediate nodes. Finally, the packets will back up through the network until entry_node no longer has any buffers to take packets from source_user. So entry_node will use the AX.25 RNR packet to tell source_user to flow-off. TOO LATE, the network is already hopelessly congested. What should have happened is that exit_node noticed that packets were coming in for dest_user faster than they were being delivered. When exit_node notices the problem, it sends a message to entry_node telling source_user to stop (entry_node uses the AX.25 RNR). Now the network is not congested, and the source user is stopped. Exit_node must tell entry_node to restart when conditions will allow. So entry_node has TWO conditions to check for: 1. Flow-off the source user if entry_node is low on buffers, or 2. Flow-off the source user if exit_node cannot deliver packets. Only when BOTH conditions have cleared can source user inject more packets into the network. There are many other methods of congestion control, and this is obviously a simple one with some deficiencies, but it is easy to implement.

One of the difficult points to bring up is lack of a layer 3 protocol between the user and the node. Since only the link-layer protocol is currently defined in AX.25, certain problems arise in the operation of the network.

When source user first connects to the network, he must engage an interactive question-and-answer session so that the network knows to whom source user wants to connect. A layer 3 protocol would provide this facility a connection establishment.

When exit_node connects to dest_user, the destination user thinks it is connected to the network, the dest_user does not know the name of source user unless the network specifically tells dest_user PRIOR to delivering traffic to dest_user. Again, this facility would be provided by a layer 3 protocol in AX.25.

Although this doesn't seem too major a point, consider the operation of BBS's with a network. You connect through a network to a BBS. What does the BBS think your call sign is? The call sign of the network, of course. How does a BBS perform mail-forwarding through a network? Each BBS could "kludge" a method to use to the network, but a standard method that works REGARDLESS of who designed, built, and programmed the network would really be nice. This should be in the domain of the AX.25 layer 3 protocol.

One of the objectives in the protocol we designed for the layer-3 inside of the network (IP) was to allow the operation of a device known as a Network Bulletin Board (NBBS). Since the TEXNET IP3 header contains enough information, a NBBS can be a device that talks to the network AT 9600 baud directly on the IP link. It must emulate a NCP, but it has the information to do that. Ideally, it would be a multi-user NBBS, since the IP supports multiple users per NCP.

For those who have read this far, this network can be described as the type that presents a virtual-circuit interface to the host, but uses a datagram method inside the subnetwork. This makes the network similar to ARPANET, and not like SNA, or DECNET. (See Tannenbaum, Fig. 5-4)[1].

Part 6 of this series will describe one way to put together

Coordinators Column

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George, wb6ral
December 15, 1985

Here we go again...

There has been a general consensus amongst some of the "old guard" that 1985 was a dull year; a year that little happened.

Not So! 1985 saw a continuation of many of the trends that were seeded in earlier years as well as a great many completely new events both on a national as well as more local scale.

Here is a quick "Year in Review" for those that missed it:

New Vendors

Several new vendors have entered the Packet Fray. Heath(kit) adapted the TAPR TNC-1 design and actually put a cabinet around it and have sold bunches of the Heath HD-4040 packet boxes.

Kantronics has produced their software driven (and thus quite inexpensive) TNC and are busily upgrading it as you read this.

And, there is PacCom. Created back east by some packet interested hams, PacCom will support the TAPR TNC-2 and much much more from its Florida location. They are just starting up and could use your patronage... (813) 689-3523.

Several New Products

Aside from the new boxes put out by the above, there have been new product announcements from some of the "established" Packet vendors.

TAPR labored long and hard and has come out with their "next generation" TNC, the TNC-2. This is smaller, lower cost, lower power, and all that one would expect from newer technology.

AEA has made a statement with its PK-64 Commodore 64 product. One of a long (very long) line of Commodore 64 compatible products, the PK-64 is a TNC that almost anyone can use. Packet radio moves into the appliance operators shack.

GLB continues to upgrade their product line of software driven TNC products; they match feature for feature most of the TNCs and software produced by anyone.

Research Being Done And Brought To Fruition

Steve Goode, k9ng, developed and demonstrated his solution to SLOW packets. He developed and released to public domain a 9600 baud modem for use with commonly available and barely modified radios. With the present User channels filling, this development is none too soon.

Networking Software, ah, networking software. There HAS been a lot of Real Research in the Networking side of Packet Radio. There are a lot of problems and some rather entrenched egos to be overcome here, but, there IS networking software running and (well...) next year we should see some first rays of hope on some Real Solutions to the networking problem.

As Packet radio spread to the higher elevations, many mountains have received a digipeater. These unattended sites have driven the development of better digipeating software and pinpointed reliability enhancing modifications to existing hardware. Again, this information is in the public domain and widely disseminated.

Ron, wa8ded, developed an advanced software package for the TAPR TNC-1 which spread all over the country with amazing speed. Those of you familiar with this software are probably delighted. The actual import of Rons' software is that Packet Radio is starting to cut the "TAPR umbilical" cord. TAPR has always moved with a speed that was governed by their manpower constraints; packet radio is now on its own.

PACSAT continues...

PACSAT is the packeteers answer to OSCAR, "F" layers, and moonbounce. -Harold, nk6k, is managing a project to provide orbital digipeating. This project is, from all indications, well and on schedule... these things take time.

Rapid growth of HF packet

Coincident with the almost explosive growth of VHF/UHF packet radio there has been an amazing increase in HF packet radio activity this past year. Driving this mode is the turnkey software written for the (RIP) Xerox 820 computer board by Hank, wOrli. This software has enabled a countrywide network to develop linking mailboxes and their users.

"Where is the Bay Area HF gateway?", you ask...

Having talked about the Year That Was, I just have to talk about
The Year That Will Be. Some quick guesses:

With wd6cmu and others locally driving dual port (220 high speed and 2 meter low speed) digipeaters as well as the progress being made by the Southern California types, we will see a 220MHz backbone go up and have its "trial by fire".

Oregon (and points North from there) will come "on-line".
(THEN you will see some traffic!)

Arizona and Nevada will become solid during 1986 with Utah a possibility.

HF gateways will continue their chaotic expansion; more HF "channels" will support traffic.

The "westnet map" will become too complex to digest on paper; programs will be written to run on mailboxes for people to determine paths.

Mailboxes will start becoming "servers" with more than just "maildrop" capabilities; they will support functions like satellite location and other amateur radio related functions.

People will still complain at the end of 1986 that "nothing has happened" and someone shall have to write something like this to remind them...

Have a good 1986!

New Coordinations:

The following PPRS Packet Radio coordinations have been issued during the month of November, 1985:

n6dbt-1	145.03MHz	Livermore (@ 2600 feet)
n6dbt-2	145.03MHz	Fremont (@ 3200 feet)
wb6fsp-1	145.03MHz	Melcher Hill (Fremont low level)
wa6osa-1	145.09MHz	Fresno (@ ~5000 feet)
wd6cmu-1	145.09MHz	Berkeley

California

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California recorded its first "DX" contacts out of state in March 1985, when Jack, wa7dia, brought Reno, Nevada onto "Westnet" (however briefly).

Efforts Ongoing to Oregon and Arizona.

We almost made it to Oregon (and thence to the Far North) this year with a digipeater up on the Oregon/California border. "Almost" doesn't make it in packet radio either.

We also almost made it to Arizona. They seem to be willing to link into the net if "we" do all the work... maybe in 1986 we will.

The first "solid" packet path opened up very early in 1985 between Southern and Northern California. It is now possible to connect between virtually any two cities in California with a reasonable station. One club alone has six digipeaters covering California from Mexico to Oregon.

Mailboxes are starting on all freqs -- more than one seems to be on each LAN. This is a good trend. Each LAN will develop its own support facilities and User base(s). Who would have thought in December 1984 that there would be more than five mailboxes available to the Bay Area User?

145.05 now being used statewide! This is an interesting 1985 event because it shows that there is enough (more than enough) traffic on packet to support this, a "second" Statewide WAN. Who would have thought?

Gripe of the Month...
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Last months gripe regarded the amazing amount of uncoordinated mailboxes on 145.01... where people are trying to get "long haul" north south paths to work...

This month we explore the phenomenon of

SIMPLEX TRAFFIC ON DIGIPEATER INPUTS

now, (almost) no one would use the input frequency of a voice repeater for a QSO with another close station... but, yet, there are an amazing number of stations who think nothing of starting up a simplex QSO (and really sending some traffic!) on the input frequency of a digipeater. What they do not realize (I would hate to think that they are malicious) is that all digipeaters that can hear them are being "jammed" by their seemingly benign QSO... there is no difference to the digipeater if you are talking through it or not... it still has to receive your packet and decide what to do with it... this ties it up.

THERE IS NO GOOD REASON TO STAY ON THE INPUT OF A DIGIPEATER (or mailbox) WITH YOUR SIMPLEX QSO...

What do you do?? Easy! WITHOUT disconnecting, just tell the other party that you are moving to 146.58 MHz. (as an example).. then move! After a couple of seconds you should again be linked up. Then, you will not be interfering with stations using the digipeater, nor will your QSO be impacted by the digipeater traffic.



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